keeled. Areola slightly wider than long, rounded at the base, the apex bulging inwardly; the base of posterior median area smooth, the rest transversely striated; the outer apical areæ are more strongly and widely striated. The upper half of propleuræ closely punctured, as are also the mesopleuræ; the metapleuræ are more closely and strongly punctured. First segment of abdomen aciculated, the post-petiole more strongly and raised in the middle; the second and third segments are closely punctured; the gastrocœli wide, striated, the oblique apex aciculated.

XXIV.—*Preliminary Note on certain Points in the Anatomy of* Eryx *and other* Boidæ, *partly indicative of their Basal Position among the Ophidia.* By Frank E. Beddard, M.A., F.R.S.

It is generally believed that the Boidæ occupy phylogenetically a place at or near the base of the Ophidian series; and this view is expressed by Boulenger in a tabular statement of the mutual affinities of the various families of the Order *. This opinion is largely based upon the persistence of considerable vestiges of the pelvic girdle and upon the paired lungs. In studying the anatomy of snakes I have been able to note a few other points to which little or, in some cases, no attention has been paid and which tend to the support of this conclusion. My observations bearing upon this subject were made upon *Python*, *Eryx*, and *Boa*.

The first point to which I would draw attention is the equal size of the right and left aortic arches, which join to form the dorsal aorta. In at least many other snakes (for example, *Zamenis flagelliformis*) the right aortic arch is so much the smaller that it appears almost as an inconspicuous branch of the left. It would appear, however, that in *Python bivittatus* this is not the case †, though Dr. Gadow's drawing ‡ of *Pelophilus madagascariensis* is in accordance with the facts which I have observed.

Secondly, the intercostal branches of the aorta are arranged in a fashion which appears to me to be distinctly archaic. In most snakes the intercostal arteries are very irregular in

* 'Catalogue of the Snakes in the British Museum (Natural History),' London, 1893, vol. i. p. 2.

† Bronn's 'Klassen und Ordnungen des Thierreichs,' Bd. vi. Abth. iii. pl. cxxxiv. fig. 2. This figure is copied from Fritsch.

‡ *Ibid.* pl. cxxxv. fig. 1.

their origins from the dorsal aorta and their points of entrance into the thickness of the dorsal parietes.

They arise at unequal intervals from the aorta and enter the parietes at varying distances from each other. In *Python reticulatus*, Hopkinson and Pancoat * did not figure these arteries at all; but Jacquart † in another python figured them as single arteries arising regularly from the aorta ‡. I do not find this in *Python spilotes*. But as the conditions in *Eryx* are more primitive still, I refer to that snake only for the present. Here the intercostal arteries are practically regular in their arrangement, being metamerically disposed in agreement with the vertebræ. There is a pair to each intervertebral interval. The two arteries of the pair either arise side by side from the aorta, or an artery single in its origin soon bifurcates. I cannot but think that this arrangement of the intercostals is more primitive than that which is more usual among the Ophidia. I may remark that it occurs in the Lacertilia (e. g. *Chamæleon*, *Tiliqua*, &c.).

I am uncertain whether to regard the total absence of a gubernaculum, tying down the ventricle to the pericardium, as indicative of a primitive structural relationship. It may at first appear unnecessary to record the fact of the absence of a gubernaculum. For it is generally stated § that the Ophidia are to be contrasted with the Lacertilia in this very point—the Lacertilia possessing a gubernaculum and the Ophidia being deprived of one. I find, however, considerable vestiges of this "tag" in certain Ophidia, but not in *Eryx* or *Boa*. On the other hand, I think it may be regarded as probable that a conspicuous azygos vein is a primitive feature. Now in *Python spilotes* this vein collects blood from and therefore extends over many more than four intercostal spaces, which is the limit of this vessel in *Coronella getula*. In *Eryx conicus* the azygos vein collects blood from no less than ten intercostal spaces.

As a general rule a considerable number of renal arteries (even as many as eight in *Coluber catenifer*) supply each kidney. This is correlated with the considerable length of the gland in most snakes; I cannot, however, ascertain that there is an exact relationship between the length of the kidney and the number of arteries supplying it. But the

* Trans. Amer. Phil. Soc. v. 1837, p. 121.

† Ann. Sci. Nat. (4) iv. p. 321.

‡ In *Python Sebæ* I find an identical arrangement. The arteries arise singly and bifurcate just before entering the parietes.

§ For instance, in that section of Bronn's 'Klassen und Ordnungen des Thierreichs' which deals with snakes.

existence of only a single renal artery on each side in some Boidæ, though doubtless associated with a small kidney *, is of itself, as it appears to me, a primitive character, inasmuch as there is here an absence of reduplication, so common a feature of the vascular and other systems in the Ophidia.

The same arguments may be used in the case of the gastric arteries, which are two in *Eryx* and three in *Python spilotes*. In the genus *Coluber* there may be as many as ten or eleven gastric arteries.

It is not common in snakes, so far as my experience goes, for the two carotids at their origin to be equal in size: they are, however, in both *Eryx jaculus* and *E. conicus*, but not in *Python spilotes*. Another primitive (?) feature which is found in only one of the two genera mentioned is connected with the dorsal musculature of *Python spilotes*. As a general rule, in snakes a beautiful complex of tendons is seen to occupy the dorsal median region when the animal is opened from below. In *Python* this region is much less converted into tendon; it remains muscular. Now there is evidence elsewhere in the animal kingdom of muscles becoming more tendinous or being converted entirely into ligaments, but not of ligaments and tendons acquiring a muscular character †.

Some features in the circulatory system, other than those briefly referred to above, are not without interest.

It is at least rare among snakes ‡ for the arteries supplying the gonads to arise from the aorta opposite to each other instead of one being in front of the other. Nevertheless, in a female *Eryx conicus* the ovarian arteries form a pair arising side by side. As is usual, these arteries immediately follow the superior mesenteric.

It is a peculiarity of snakes, contrasted with lizards, that the anterior abdominal vein of the latter is single, while it is at least sometimes partly double in the Ophidia. This point of difference from the Lacertilia, and, so far, of resemblance to the Crocodilia, is apt to be slurred over in text-books. In one specimen of *Eryx conicus* the vessel was single throughout; in another it was partly double, as was the case with two specimens of *Eryx jaculus*. In *Boa constrictor* the vessel was single for a distance of six inches behind the gall-bladder and thence to the cloaca double.

* In *Heterodon platyrhinus*, for example, the proportions between the length of the body (to the vent) and the length of the larger kidney are 9 : 1, in *Boa constrictor* 15 : 1.

† For example, one of the glutæal muscles in hornbills.

‡ I have not myself observed a single instance, except in the case mentioned above.

In *Python Sebæ* the fluctuation of this vein between the single and double condition was more plainly seen. Just in front of the gall-bladder the vessel communicates with the gastric portal vein; from this point to two inches behind the gall-bladder it is single. For a distance of 4½ inches it is formed of two tubes lying side by side; these then reunite and finally again separate to form two tubes. This example shows that the double character of the vein is not only due to the elongation of the body, and as a consequence the equivalent of the posterior double region of the same vein in Lacertilia, where it emerges from the two posteriorly situated fat-bodies.

XXV.—*Description of a new Genus of Spatangoids.*

By F. Jeffrey Bell, M.A.

Among the Prymnodesmid Spatangoids (or those with a subanal fasciole) the genera known as *Brissus*, *Meoma*, and *Metalia* are ordinarily recognized as forming a compact group. I have lately received from a valued correspondent, Mr. F. W. Townsend, some specimens from the coast of Oman which have a striking resemblance to these three, but are at once distinguished from all of them by the position of the apex, which is hardly, if at all, excentric. This subcentral position of the apex suggests that this new form is phylogenetically older than the three genera to which it seems to be allied; and I suggest for it, therefore, the name of *Eobrissus*.

The genus may be diagnosed in the following terms:—A Prymnodesmid Spatangoid with the apex almost central and the anterior ambulacrum flush with the test; the antero-lateral ambulacra directed forwards and not at right angles to the long axis of the test; an open circumanal fasciole, as in *Metalia*.

The possession of a circumanal fasciole has generally been regarded as a recent acquisition, so that it is of importance to note its coexistence with the archaic position of the apex.

Specific characters and name.—As there is but a single form known, the specific characters must be guessed at. In general appearance like a small *Brissus unicolor*, with light-coloured Brissine spines, none of much greater length than the rest; those on the abactinal side longer and sharper than those on the actinal. Larger tubercles scattered among the smaller on the actinal surface, more regularly larger below; the lateral ambulacra moderately wide and slightly sunken. Four pairs of pores on each side within the subanal fasciole.